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Partial Translation of Japanese Laid-Open Utility Model
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Title: SEMICONDUCTOR APPARATUS

Applicant: Mitsubishi Electric Corporation

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Conducting wires 15, 16 connected to a cooling fin 6 of a semiconductor stack 4 are connected to air tight terminals 17, 18. These air tight terminals 17, 18 are connected to external conducting wires (not shown) from the outside of a container. Further, the cooling fin 6 is connected to a parallel resistor (not shown) with conductive wires. A condenser 14 is arranged above a container 1. The container 1 communicates with the condenser 14 through pipes 12, 13. It is preferable that the inside of the container 1 is filled with a sufficient amount of refrigerant 10 to submerge the semiconductor stack 4, and that a space 11 is left in the upper portion of the container 1. Further, it is preferable that the space in the container 1 is filled with only a vapor of the refrigerant and an air or the like is not mixed. As the

refrigerant 10, the following substance may be used. The substance has excellent electric insulation characteristics and boils at a temperature equal to or lower than an upper permissible temperature of a semiconductor device 5, such as trichloromonofluoromethane (CCl_3F) and trichlorotrifluoroethane ($\text{C}_2\text{Cl}_3\text{F}_3$).

Effects of the apparatus shown in the drawings are explained below. Due to the heat produced in the semiconductor device 5, the refrigerant 10 abutting the semiconductor device 5 and the cooling fin 6 starts to boil. At this time, the heat is taken away from the semiconductor device 5 or the cooling fan 6 as vaporizing latent heat, and the semiconductor device 5 is cooled. The vaporized refrigerant 10 rises above the container 1, and enters the condenser 14 through the pipe 12. The condenser 14 cools the vaporized refrigerant 10 in an appropriate manner such as natural cooling, compulsory air cooling, and water cooling to condense and liquefy the vaporized refrigerant 10. Therefore, the vaporized refrigerant in the condenser 14 is cooled and condensed, and the liquefied refrigerant returns to the container 1 through the pipe 13.